

REMARKS/ARGUMENTS

Claims 1-20 are pending in the present application. Claims 1-3, 8-9 and 15-16 were amended. Reconsideration of the claims is respectfully requested.

On August 17, 2006, the Examiner and Applicants' attorney discussed the application, office action and cited reference by telephone. Applicants, through their attorney, express appreciation to the Examiner for his helpful comments, particularly in regards to use of the RAID acronym.

I. Objection to Claims

The Examiner has stated that Claims 3-5, 7, 10-12, 14, and 17-19 were objected to because the acronym "RAID" should be spelled out as a complete term, as these are the claims in which the acronym is mentioned for the first time. In response, the claims have been rewritten to overcome this objection, by spelling out the complete term the first time it occurs in each claim tree.

II. 35 U.S.C. § 101, Non-Statutory Subject Matter

The Examiner has rejected Claims 15-20 under 35 U.S.C. §101 as being directed towards non-statutory subject matter. This rejection is respectfully traversed.

The Examiner asserts that Claims 15-20 are directed to a computer program product, are not limited to tangible embodiments, and are therefore non-statutory. Applicants respectfully disagree. Each of the Claims 15-20 recites a computer program product on a computer readable medium. Moreover, no basis is present for holding a computer usable medium claim to be non-statutory, just because the medium may be allegedly "intangible." The MPEP states:

In this context, "functional descriptive material" consists of **data structures** and computer programs **which impart functionality when employed as a computer component**. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure *per se* held nonstatutory). **(emphasis added)** **MPEP 2106 (IV)(B)(1)**

Claims 15-20 recite clearly functional descriptive material, since such material imparts functionality when employed as a computer component. Moreover, the functional descriptive material of Claims 15-20 is recorded on “some” computer readable medium.

In the above context, the term “some” means “any” computer readable medium. The MPEP does not draw any distinctions between one type of media that is considered to be statutory and another type of media that is considered to be non-statutory. To the contrary, the MPEP clearly states that as long as the functional descriptive material is in “some” computer readable medium, it should be considered statutory. The only exception to this statement in the MPEP is functional descriptive material that does not generate a useful, concrete and tangible result, e.g., functional descriptive material composed completely of pure mathematical concepts that provide no practical result. Claim 15 clearly recites a useful, concrete and tangible result by defining two or more data storage segments on an individual hard drive, and associating first and second read/write heads therewith, in response to a mode select command having multiple parameter selection fields, and storing data on the data storage segments. Claims 16-20 respectively depend from Claim 15, and recite similarly useful, concrete and tangible results in further limiting Claim 15. It is thus readily apparent that the subject matter of these claims is not just mere disembodied mathematical concepts or abstract ideas.

Accordingly, Claims 15-20 are respectively directed to functional descriptive material that provides a useful, concrete and tangible result, and which is embodied on “some” computer readable medium. Therefore, claims 15-20 respectively are statutory, and the rejection of these claims under 35 U.S.C. §101 has been overcome.

Moreover, use of a computer readable medium such as a floppy disc or CD-ROM in Claims 15-20 would clearly raise no issue of non-statutory subject matter. Devices of these types are characterized by the ability to store computer-related data for periods of time, and data can be written thereinto and be read therefrom at will. Applicant considers that if desired, those of ordinary skill in the art could readily conceptualize and construct a computer readable medium that had all the above characteristics of a CD-ROM or the like, and at the same time used one or more transmission-type or wireless communication links as a primary storage element. For example, the communication links could be connected to form a closed loop containing data packets in the form of electromagnetic energy. The packets would be continually circulated around the loop for a specified period of time, and data could be read therefrom and written thereinto.

III. 35 U.S.C. § 102, Anticipation

The Examiner has rejected Claims 1-3, 6, 7, 8-10, 13, 14, 15-17 and 20 under 35 U.S.C. §102(e) as being anticipated by U. S. Patent Publication No. US 2004/0179386 A1, to *Jun*. This rejection is respectfully traversed.

IV. 35 U.S.C. § 103, Obviousness

The Examiner has rejected Claims 4, 5, 11, 12, 18 and 19 under 35 U.S.C. §103(a) as being unpatentable over *Jun*. This rejection is respectfully traversed.

V. 35 U.S.C. § 101, Double Patenting

Applicants' Claims 1-20 have apparently all been rejected on the ground of non-statutory obviousness-type double patenting, as being anticipated by or obvious in view of claims of the *Jun* reference. This rejection is respectfully traversed.

As discussed hereinafter in further detail, Applicants consider that none of their Claims 1-20, as now amended, is anticipated under 35 U.S.C. §102 by any part of the *Jun* disclosure, including any *Jun* claim. Applicants also consider that none of their Claims 1-20 is obvious under 35 U.S.C. §103, in view of any part of *Jun* including any *Jun* claim. Clearly, if a claim is neither anticipated by a reference under 35 U.S.C. §102, nor is obvious under 35 U.S.C. §103 in view of the reference, the claim cannot be rejected on the ground of double-patenting in view of the reference. Accordingly, this rejection has been overcome.

VI. Teachings of Applicants

In making their invention, Applicants sought to provide redundancy, in order to avoid unrecoverable data errors in a relatively small computer system or the like. Applicants recognized that their goal could be realized by storing the same data on two different segments of the computer hard drive, using separate read/write heads. Moreover, Applicants recognized that it would be very beneficial to achieve the above goal without modifying the standard read/write commands of the computer. Accordingly, Applicants use a mode select command to set and format the hard drive to one of multiple levels of a Redundant Array of Independent Disks (RAID). Use of the mode select command eliminates any need for additional RAID setup procedures or maintenance. The mode select command of Applicants is a software device comprising a RAID Page that is formatted to have multiple parameter selection fields, as shown by Table I at page 11 of Applicants' specification. The above teachings are further disclosed in the application such as at page 10, lines 10-24, page 12, lines 8-17, and page 13, lines 1-11, which read as follows:

Essentially, for this exemplary embodiment, process 300 provides a RAID-type mirroring functionality for an individual hard drive (e.g., SCSI hard disk drive 232 or 276), and makes that hard drive responsible for performing all RAID functions by partitioning data on the physical surfaces of the disk(s) involved. Advantageously, the host system (e.g., OS running on processor 201, 202 or 252) is not required to modify any standard read/write commands in order for the host system to read or write data from or to the RAID array on the hard drive involved. A RAID Mode Select command is used to set the hard drive to a desired RAID level (e.g., RAID level 1, 3 or 5). Once the hard drive is set to the desired RAID level and formatted, no additional RAID setup procedure or maintenance is required. **[page 10, II. 10-24.]** (*Emphasis added*)

Referring to the example Mode Select command (e.g., defining a “RAID Page”) shown in Table 1, the ANSI SCSI Committee can assign the parameters to be used for the Page Code field. The Page Length field can be used to define the number of bytes remaining on the specific page involved. For this exemplary embodiment using a SCSI hard disk drive, the number of bytes remaining on this page can be (05)h. The Redundancy Mode field can be used to describe the type of redundancy to be used (e.g., RAID 0, 1, 3 or 5). **[page 12, II. 8-17.]**

In response to receiving the “RAID Page” Mode Select command, the hard drive involved prepares the physical disk surface for the RAID operation defined by the Mode Select command (step 306), and formats the data storage segment according to predefined user and/or operational requirements. For example, the Mode Select command can include a parameter representing a RAID 1 mode of operation in the Redundancy Mode field. Once the hard drive completes the physical disk surface preparation and formatting for the requested mode of operation (e.g., RAID 1), the hard drive begins to operate in the requested mode of operation (step 308). **[page 13, II. 1-12.]** (*Emphasis added*)

Claim 1 has been amended to recite the above teachings and now reads as follows:

A method for redundant data storage on an individual hard drive, comprising the steps of:

defining at least two data storage segments on said individual hard drive;
associating a first read/write head with a first data storage segment of said at least two data storage segments;

associating a second read/write head with a second data storage segment of said at least two data storage segments;

said defining and associating steps are performed in response to receipt of a software mode select command that has a format comprising multiple parameter selection fields, and is used to set the hard drive to a redundant array of independent disks (RAID) level selected from any one of multiple RAID levels; and

responsive to a write operation for storing a predefined set of data on said individual hard drive, storing said predefined set of data on said first data storage segment with said first read/write head, and storing said predefined set of data on said second data storage segment with said second read/write head.

VII. Rejection of Claim 1

In the Office Action, the Examiner stated the following in rejecting Claim 1:

10. Claims 1-3, 6, 7, 8-10, 13, 14, 15-17 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Jun [US 2004/0179386 A1].

Per claims 1, 8 and 15, Jun teaches a method for redundant data storage (see Abstract) on an individual hard drive (Hard Disk Drive 200, see Fig. 2 and Pg. 2, Para. [0028]), comprising the steps of:

defining at least two data storage segments on said individual hard drive (“WRT_POSITION” and “BCK_POSITION”, see Fig. 2 and Pg. 2, Para. [0029]; “upper and lower portions of one disk-shaped medium”, see Pg. 3, Para. [0032] and [0042]; Claims 1-5, 7-9, 16 and 20);

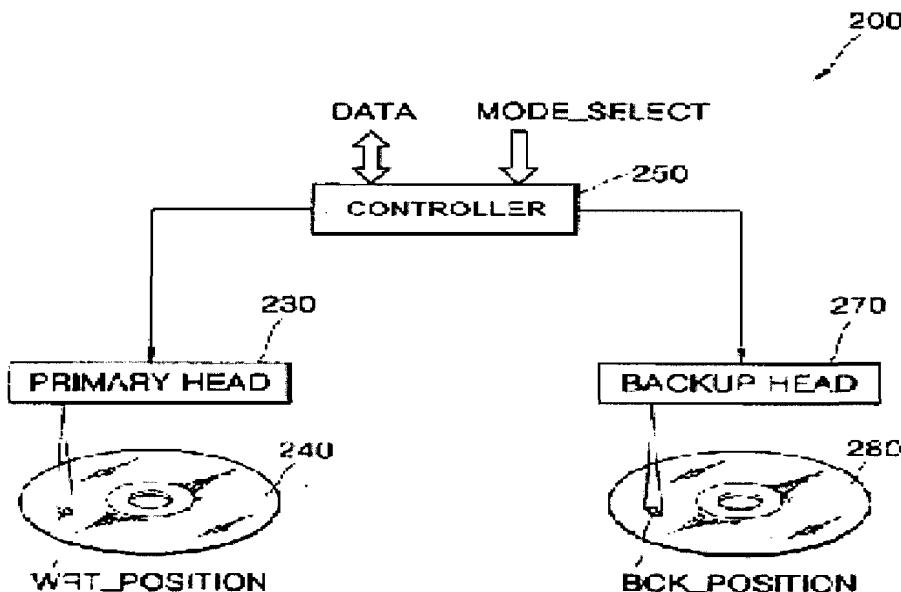
associating a first read/write head with a first data storage segment of said at least two data storage segments (Primary Head 230 and Backup Head 270, see Fig. 2, Fig. 3; Pg. 2, Para. [0028]-[0029]; Claims 1-5, 7-9, 16 and 20);

associating a second read/write head with a second data storage segment of said at least two data storage segments (Primary Head 230 and Backup Head 270, see Fig. 2, Fig. 3; Pg. 2, Para. [0028]-[0029]; Claims 1-5, 7-9, 16 and 20); and

responsive to a write operation for storing a predefined set of data on said individual hard drive, storing said predefined set of data on said first data storage segment with said first read/write head, and storing said predefined set of data on said second data storage segment with said second read/write head (Pg. 2, Para. [0029]; Pg. 3, Para. [0038] and [0042]; Claims 1-5, 7-9, 16 and 20).

[Office Action dated May 26, 2006, pp. 5-6.]

Applicants consider that pertinent teachings of *Jun* are set forth at Figure 2 and at paragraphs [0010], [0031], [0038], and [0040] thereof. These sections of *Jun* are as follows:



Jun, Figure 2.

[0010] However, in order to implement the RAID system, additional hardware is needed to support the operation of the RAID system shown in FIG. 1. In addition, the hard disk drives must be compatible with the additional hardware. Since a plurality of hard disk drives, such as the data-writing hard disk drive and the backup hard disk drive, are needed to implement the RAID system, costs increase.

[0031] The controller 250 may be a microcontroller controlled by firmware. In this case, the microcontroller detects a mode selection signal MODE SELECT and controls the hard disk drive 200 to operate under a RAID mode or a normal mode. In addition, if the controller 250 is a micro controller controlled by firmware, the hard disk drive 200 can achieve a self-RAID system without including additional hardware required for a RAID outside the hard disk drive 200. Since control over the primary head 230 and the backup head 270 is carried out by the controller 250 within the hard disk drive 200, it is not necessary for an external device of the hard disk drive 200 to recognize whether or not the hard disk drive 200 operates under a RAID mode. Also, a user can operate the hard disk drive 200 under the self-RAID mode or the normal mode, using the mode selection signal MODE SELECT and convert one operation mode of the hard disk drive 200 into the other even after selecting one of the modes. (*Emphasis added*)

[0038] If the two heads can operate in pairs, the hard disk drive operates under the self-RAID mode (S46), which means that the hard disk drive groups heads in pairs and drives a pair of heads to write and read the same data. Where the hard disk drive operates under the self-RAID mode (S46), the storage capacity of the hard disk drive is set to half of the total storage capacity, since the total storage capacity of the hard disk drive is not used and instead the same data is written twice, once by the primary head and once by the backup head. Since the user can store valuable data and the backup thereof during the self-RAID mode, it is possible to minimize data loss.

[0040] As shown in **FIG. 4**, the user can select the operation mode of the hard disk drive. Thus, if the priority of the user is capacity, the whole capacity can be used for the data write operation. If the priority of the user is stability of data, the user selects the self-RAID mode, such that the hard disk drive operates under the self-RAID mode. Once the user selects the operation mode of the hard disk drive as shown in **FIG. 4**, the controller of the hard disk drive controls the operation mode of the hard disk drive. Thus, the hard disk drive can be used by using other methods.

A prior art reference anticipates the claimed invention under 35 U.S.C. §102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). All limitations of the claimed invention must be considered when determining patentability. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994). Anticipation focuses on whether a claim reads on the product or process a prior art reference discloses, not on what the reference broadly teaches. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983). Moreover, it is a fundamental principle of patent law that prior art must be considered in its entirety. **MPEP 2141.02**.

Applicants respectfully submit that the *Jun* reference does not teach every element of the claimed invention arranged as they are in Claim 1. For example, *Jun* does not teach, in the over-all combination of Claim 1, the following Claim 1 features:

- (1) The defining and associating steps are performed in response to a software mode select command that has a format comprising multiple parameter selection fields (hereinafter “Feature 1”).

(2) The defining and associating steps are performed in response to a mode select command that is used to set the hard drive to a RAID level selected from any one of multiple RAID levels (hereinafter, “Feature 2”).

VIII. Features (1) and (2) of Claim 1 Distinguishable over *Jun*

Applicants’ Feature (1) teaches performing the defining and associating steps of Claim 1 in response to a software mode select command that comprises multiple parameter selection fields. Feature (1) thus enables embodiments of Applicants’ invention to use standard read/write commands of a computer system as discussed above. Moreover, elements of Feature (1) provide a very convenient mechanism for enabling a user to select specific parameters for multiple fields of the formatted command.

In contrast, *Jun* discloses no such feature. Instead, *Jun* teaches an arrangement wherein a hardware device, micro-controller 250, is responsive to a dual mode selection signal. This signal can select only one of two possible modes, a normal mode and a self-RAID mode. Clearly, the mode selection signal is not a formatted software command. Such signal of *Jun* also fails to comprise multiple fields for selecting parameters.

Moreover, in the absence of Applicants’ teachings and without benefit thereof, *Jun* provides no reason to modify its disclosure as taught by Feature (1) of Applicants’ Claim 1. In addition *Jun* emphasizes, such as at [0010] and [0031], that an important goal of *Jun* is to avoid additional hardware, and to thereby avoid increased costs. In disclosing this important goal, *Jun* teaches away from making the substantial modifications that would be required to the *Jun* arrangement, in order to realize Feature (1) of Applicants Claim 1.

In like manner, *Jun* fails to either disclose or suggest Feature (2) of Applicants’ Claim 1, which recites a mode select command that is used to set the hard drive to a RAID level selected from any one of multiple RAID levels. For example, if the mode selection signal of *Jun* selects the self-RAID mode thereof, paragraph [0040] discloses only that the hard disk drive operates under the “self-RAID mode”. It is thus abundantly clear that the mode selection signal of *Jun* does not, in any way, select one RAID level from multiple RAID levels.

In addition, paragraph [0009] of *Jun*, in the Background of Invention section thereof, refers to multiple RAID levels. Therefore, it is quite clear that the *Jun* inventors were well aware that there are multiple RAID levels. Notwithstanding this knowledge, however, *Jun* in no way teaches or suggests that its mode select signal could be used to set the hard drive thereof to any one of multiple levels, as recited by Feature (2) of Claim 1. Applicants consider that this deficiency of *Jun* emphasizes that Applicants’ Feature (2) is manifestly non-obvious in view of *Jun*. In addition, *Jun* provides no suggestion or basis for

modifying its arrangement in accordance with the teachings of Feature (2). Once again, any such modification would be in opposition to *Jun*'s stated objective of avoiding additional hardware and costs.

IX. Claims 2 and 3 Distinguish over Jun

Claims 2 and 3 respectively depend from Claim 1, and are each considered to patentably distinguish over the art for the reasons given in support thereof.

Claim 2 is additionally considered to distinguish over the art, including the *Jun* reference, in reciting that one of the multiple parameter selection fields of the mode selection command is used to specify the RAID level selected from any one of the multiple RAID levels. Applicants consider that the *Jun* reference neither discloses nor suggests this feature of Claim 2.

Claim 3 is additionally considered to distinguish over the prior art, including the *Jun* reference, in reciting a third read/write head associated with a third storage segment from the hard drive that is used to store parity information pertaining to data stored on the first and second data storage segments. This feature is disclosed in the application such as at page 15, lines 15-22. Applicants consider that the *Jun* reference neither discloses nor suggests such recited feature of Claim 3.

X. Remaining Claims Distinguish over Jun

Claims 8 and 15 incorporate subject matter similar to the patentable subject matter of Claim 1, and are each considered to distinguish over the art for the reasons given in support thereof.

Claims 4-7, 9-14 and 16-20 depend from Claims 1, 8 and 15, respectively, and are each considered to patentably distinguish over the art for the reasons given in support thereof.

Claims 9 and 16 respectively incorporate subject matter similar to patentable subject matter of Claim 2, and are each additionally considered to distinguish over the art for the reasons given in support thereof.

XI. Conclusion

It is respectfully urged that the subject application is patentable over the *Jun* reference and is now in condition for allowance.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,

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